

Relief Measures During and Following the Mississippi Valley Flood*

J. H. O'NEILL

Sanitary Engineer, State Board of Health, New Orleans, La.

THE RECENT flood was, as all such floods are, a combination of synchronized events. A heavily flooded Ohio was met lower down by flood flows in the Arkansas and the White. These were due to rains in the corner of Oklahoma, Missouri, and Arkansas just at a time to bring the rivers draining that territory in concurrent flood with the Mississippi at their mouths.

A flood stage was reached in the Ohio River in March, and from that time on, with heavy rains in the various tributary valleys, the situation became more serious, and it soon became apparent that the valley was faced with the greatest high water fight in its history. The first break occurred at Walnut Bend, 278 miles below Cairo, on April 15; this was followed the next day by a break at Dorena, near New Madrid. Breaks occurred at 5 more localities in April, including a break on the west bank, about 40 miles below New Orleans, caused by a steamship running into the levee. The most serious of these was on April 21, at Stopps Landing on the east bank, about 20 miles north of Greenville, Miss., a city of 12,000 population.

Breaks occurred at 7 places in May, including the break on the east bank, about 15 miles below New Orleans, which was made purposely with a view to protect New Orleans by reducing flood heights at that city. These various breaks resulted in the flooding or partial flooding of 120 counties in 7 states and in driving 700,000 people from their homes. Nearly 600,000 of these were taken care of in 149 refugee camps. Others had issued to them rations and supplies. Three million, eight hundred thousand acres of agricultural lands were flooded.

This very brief history of the flood itself is offered as an introduction to a discussion of the main theme of the paper. It may give some idea of the duration of the fight. It cannot give more than a mere hint of its magnitude; of the length and strength of the battle line; of the constant and nerve straining vigilance to detect promptly such danger

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points as sand boils and bank caving; the almost superhuman efforts to strengthen defenses by raising low levees, by repairing the effects of wave wash and meeting in other ways the grim, relentless, and at times, irresistible attack of the Mississippi; nor of the really wonderful coördination of the work of the various agencies engaged in rescue; of the work of the National Guard troops, American Legion, and Texas cowboys in evacuating people and live stock from threatened areas; of the rescue fleet with its thousands of units varying from skiff and pirogue to surf boats, coast guard cutters and old paddle wheel river steamers; of the thrilling dashes through the roaring waters of a crevasse as a preliminary to a voyage over fields of cane, cotton, or corn, to collect a human cargo from house tops and trees; of the aviators who made aerial surveys to collect information for the guidance of the General Staff, located refugees for the rescue fleet, or carried physicians, nurses, drugs and vaccines to groups isolated by the turbid waters.

Stories of these are in themselves epics which will be told and retold for a long time to come. They will tell of heroic self sacrifice, of dogged courage in the face of overwhelming odds, of brilliant daring, of grim tragedy, of pathos and even of flashes of humor, but can only here be mentioned as a suggestion of a background for the problems of health and sanitation.

On April 22, an advisory committee of members of the Cabinet was appointed by President Coolidge, as President of the American Red Cross, in order to coördinate fully the resources and facilities of the government with the relief operations of the Red Cross. This committee included Secretary of the Treasury Mellon, Secretary of Commerce Hoover, Secretary of War Davis, and Secretary of the Navy Wilbur. This group met with representatives of the Coast Guard, the U. S. Public Health Service and the American Red Cross. A special committee of the Red Cross for the Mississippi Valley Flood Disaster, was established with Secretary Hoover as chairman. The purpose of this committee was, as expressed by Mr. Hoover, "to coördinate the activities of the War, Navy, Treasury and Commerce Departments into support of the Red Cross, which it was determined must continue the primary responsibility for the organization and administration of the relief measures to be taken."

Government agencies had been coöperating as in the past, but this marks the first time that government efforts were placed under the direction of the Red Cross. The efficiency and effectiveness of the relief work under this plan proved its value.

Headquarters for the conduct of all relief operations were promptly

established at Memphis. On April 28 a conference was held at Memphis to consider a program for health and medical service during the flood and for the coördination of the various agencies interested. There were present state health officers and sanitary engineers of states in the flood area; and representatives of the Medical Department of the U. S. Army, U. S. Public Health Service, American Medical Association, 7 state medical societies, and the American Red Cross Medical and Nursing Services.

The conference developed, and by a series of resolutions agreed upon the following program:

Need in any community for nurses, doctors, sanitary engineers, bacteriologists, epidemiologists, and other individuals should be made known to the state health officer, cleared through him and, when he might be unable to meet the request, he would clear for action with the Medical Director of the Red Cross.

Area Directors of the Red Cross faced with an emergency situation might clear direct with the Medical Director of the Red Cross who would then notify the state department of health of the action taken.

All personnel should be released through the same channels through which they came.

The system for obtaining needed supplies should be the same as that for personnel.

The general program of immunization should be restricted to typhoid and small-pox.

Where a case of diphtheria developed, immunization should be restricted to "contacts."

The determination of individuals to be inoculated should rest in the hands of the officer in charge and be limited as far as possible to actual contacts.

The same procedure should be followed with regard to the isolation and, when possible, the immunization in regard to all contagious diseases.

Each state health department should handle its own problem in matter of rabies.

The water in refugee camps should be chlorinated and water in private supplies recommended to be chlorinated, or boiled for thirty minutes where chlorination was impossible.

Where the milk supply did not comply with the minimum requirements of the Public Health Service, the milk was to be boiled. It was recommended that dried milk be used, where an adequate supply of fresh milk was lacking.

The extent and frequency of inspection should be determined by the state health officer in the state concerned.

The set-up of a refugee camp should be: physicians in command and necessary assistants and nurses; sanitary engineer, and supply officer; facilities for isolation; and dispensary and emergency hospital when there were no existing facilities.

Provision should be made for the proper disposition of sewage.

Garbage should be disposed of daily by scavenger service.

Adequate bathing and laundry facilities should be provided in the refugee camps.

All places where food was prepared were to be screened and under the supervision of the medical officer.

Food handlers had to meet requirements of the state health department.

The problem of mosquito control—involving malaria—is a problem which should be handled by the sanitary engineer, with whatever assistance he might need.

Chloride of lime and lime should be the general disinfectants used.

It was considered that hookworm and tuberculosis did not constitute an emergency problem at the time.

In effect this program put the responsibility for the protection of the health of the refugees and the sanitation of the camps and flooded areas where it belonged, on the state board of health, and offered to the state boards of health the resources of the American Red Cross, and through the Red Cross the resources of the U. S. Public Health Service and the trained personnel of other states, who volunteered to help in the emergency.

Fortunately most of the camps could be located where water from satisfactory city supplies could be made available. In some instances water was brought to camps in tank cars from neighboring cities. In others, chlorination of supplies by the use of chloride of lime was carried out under the direction of representatives of the health department.

Few of the camps had sewerage systems but multiple seat flyproof pit latrines provided a satisfactory substitute. Constant policing, however, was necessary to maintain cleanly and flyproof conditions. Many of the camps were electrically lighted and provided with showers baths and places for washing clothes. Kitchens and mess halls were screened.

Vaccination for smallpox and typhoid fever prevention was general. In very few instances was any opposition to this measure shown. Most of the people seemed to realize and appreciate the value of this method of protection. Isolation camps were provided and field hospitals were erected for minor surgical cases.

The small, and usually temporary encampments on the levee or on mounds offered the greatest difficulty. In some instances physicians, engineers, or sanitary inspectors were carried to these areas by airplane. They carried in a knapsack, emergency equipment and supplies, including medicines, dressings, vaccines, and chloride of lime for the treatment of water supplies. In Louisiana a laboratory boat used in shellfish control was assigned to flood duty and made a serviceable mobile unit.

At the camps opportunity was taken to do educational work on various lines. Talks were given on sanitation, mosquito control, personal hygiene, etc., illustrated, where possible, by lantern slides and moving pictures. Classes were held in child hygiene and welfare work.

Except for a few outbreaks of measles and mumps, the health records at the camps have been excellent. The health conditions in the area, as far as morbidity is concerned, were on the whole better than in normal periods.

Part of the problem included the maintenance and protection of water supplies and sewerage systems of communities threatened by the flood or affected only to a point which did not require evacuation of the town. Levees were built around water plants, or doors and windows were barricaded. Emergency power lines were run in. Extra pumps were installed to take care of leakage. This equipment comprised centrifugal pumps, with electric motor, or belt driven from tractor or truck; contractor's sump pumps with gasoline motor; or whatever might be available. Through the generosity of the manufacturers, chlorinators were loaned to state boards of health and many supplies were protected in this manner. In a few instances, where only a part of the town was flooded, or where the water was not deep enough to cause the people to leave, sewer pump motors were jacked up above flood level, shafts extended, and operations continued until the flood was over.

Following the receding of the flood waters, an organization of nearly 100 physicians, nurses, engineers, and inspectors was developed to sanitize the area. This organization included many volunteers from boards of health of states outside the Mississippi Valley.

Efforts were made to complete vaccinations of all who might have missed this treatment at the camps. Cases of diseases were investigated and measures taken to prevent spread of infection. An intensive campaign to promote the building of sanitary privies was undertaken, with really good results. Training was given local men employed temporarily as sanitary inspectors. Engineering advice was given local officials in the rehabilitation of water supply and sewerage systems. Private supplies were cleaned up and chlorinated.

Lime, chloride of lime, soap, spray cans, and crude oil were distributed and local crews were organized to clean up debris, bury or burn dead animals, and to open drainage channels, drain pools and spread oil to control mosquitoes. Medical supplies, including much quinine, were distributed liberally and where necessary; funds were furnished local chapters to provide for medical treatment for those unable to pay physicians. Hundreds of homes of malaria carriers were screened; five thousand pounds of yeast were distributed as part of the measures to prevent pellagra.

On June 5 a conference was held at New Orleans, at which there were present state health officers from the flood affected states; the Surgeon General, U. S. Public Health Service; Medical Director, American Red Cross; the Directors for the United States of the Health Division, Rockefeller Foundation; together with other representatives from these organizations.

The object of the conference was to receive reports of the state health officers in the flooded areas and to consider plans for the coöperation of the Rockefeller Foundation and the U. S. Public Health Service with the official health agencies in the flooded areas and the Red Cross in developing a permanent health program to meet the needs of the communities after the temporary program of health and sanitation of the Red Cross had been fully carried out.

The vast extent of the area involved, the large economic losses and other factors, such as the possibility of lowered resistance to disease due to poverty and hardship, and the development of pellagra made it apparent that a really effective sanitary rehabilitation and public health program was a long time job. The value of the full-time county organization, or health unit, as it is generally called, had been strikingly demonstrated during and after the flood and hence, plans were made to establish a health unit for a period of 18 months in 87 counties and parishes seriously affected by the flood.

The plans provide for a unit with the following personnel: health officer, public health nurse, sanitary inspector and clerk, with provision for travelling and incidental expenses. The budget is made up of funds from the county or parish, the state board of health, the U. S. Public Health Service, and the Rockefeller Foundation, the county's share nominally being set at 25 per cent but actually being determined by the community's ability to provide funds. Where investigation showed that the county was really unable to furnish 25 per cent of the budget, part or even all of this was contributed by the coöperating agencies.

The Rockefeller Foundation established a training school at Indianola, Miss., to train personnel to carry on the work of these units. On October 1, 45 units were in operation, 19 with full complement of personnel and 26 with from 1 to 3 people on the unit staff. In 17 more counties, plans had developed to a point where it was expected that the units would be in operation within a few weeks. This program not only seems the best and most practicable method of dealing with the post-flood problems, but since it is expected that many if not all of these units will be maintained after the 18-months period has expired, it will mark a real advance in the public health movement in the Mississippi Valley.

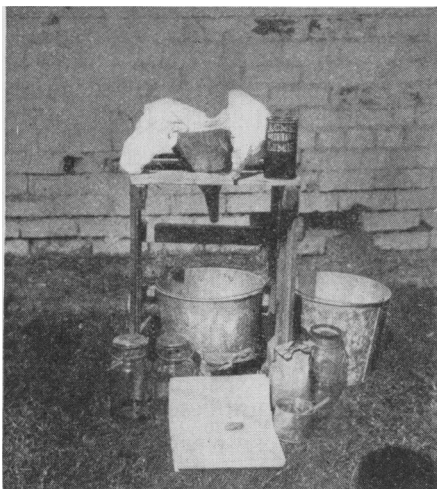
As this paper is presented to a gathering of engineers, the major part has been given to the sanitary features, but these were only a part of the task. Homes had to be repaired and rebuilt; deposits of silt removed from the towns; roads repaired; seed, tools, household equipment and clothes supplied; poultry and live stock replaced; and food

for man and beast furnished until the reclaimed lands brought forth new crops.

On September 3 the Red Cross was still feeding 62,486 persons, and 86,561 acres were still flooded. Owing to the second flood and other causes, probably 2,000,000 acres of crop land will make no substantial money returns this year. The Red Cross is still functioning in the area, which gives assurance that even though it may take some time to replace the huge losses, no one need suffer cold or hunger.

In conclusion, the writer ventures to depart from the subject of the paper to express the hope of the Valley that this great catastrophe will awaken the entire country to the realization that the Mississippi River System belongs to the country as a whole and not to the few southern states who have so frequently suffered through its floods, and that the nation, which built the Panama Canal and which counts its surplus funds by the hundreds of millions, will exert every effort to bring this mighty river under control; in brief, the hope and trust that the recent flood has been great enough to be the last one.

Purifying Mississippi Flood Water



Simple Equipment Used

EPIDEMIOLOGIST in the city of Baltimore, Md., V. L. Ellicott, M.D., found that many of the refugees would probably be without satisfactory drinking water on their return to their homes. He, therefore, experimented with the method used at the Montebellow Filtration plant in Baltimore, and found that the addition of one level teaspoonful of alum and one-half level teaspoonful of lime to a bucket of river water, dissolved, stirred for a few minutes and poured through a filter of muslin and absorbent cotton produced a perfectly clear water in a few minutes.

He gave demonstrations to the refugees in the camp and to groups of people living in flooded or partially flooded territory. Instructions, of course, were given for

sterilizing the water with chloride of lime or by boiling after filtration.